The Effects of the Federal Crop Insurance Program on Wheat Acreage

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Abstract: The Federal crop insurance program insured more than 45 million wheat acres in 2000/01, roughly 73 percent of planted acres. Catastrophic (CAT) coverage is declining in importance, while revenue insurance has become prominent in just a few years. The changes in premium subsidy rates established by the Agricultural Risk Protection Act of 2000 (ARPA) are likely to reinforce the trend toward using higher insurance coverage levels and revenue insurance. Crop insurance subsidies appear to have small effects on wheat planting decisions. Analysis here suggests that wheat acreage under the ARPA premium subsidy structure is about 0.5 percent higher than total acreage in the absence of any insurance program. While subsidies tend to increase acreage, the resulting higher production dampens wheat prices slightly and limits the acreage shift. Cross-commodity effects are important, too, as crops receiving larger insurance subsidies could crowd out those receiving less.

Keywords: wheat, crop insurance, subsidies, planting decisions, market distortions.

The Federal crop insurance program has become one of the major Government programs related to wheat production. Wheat ranks third, behind corn and soybeans, in terms of acreage insured and premiums collected. The program insured 45.4 million acres of wheat for the crop harvested in 2000, about 73 percent of the planted area of wheat for all purposes.[2] New forms of crop insurance coverage, higher premium subsidies, and a shift away from counter-cyclical farm programs in the 1996 Farm Act all appear to have contributed to the growth of insurance. Among wheat producers, yield insurance products accounted for most of the insured acres in previous years, but revenue insurance products appear set to take the lead for the 2001/02 crop.

ARPA provides premium subsidies greater than 50 percent for most levels of coverage and makes the premium rates for higher levels of coverage more attractive. Premiums for revenue coverage will also receive the same subsidy rate as yield insurance under ARPA, which should encourage greater use of revenue coverage. Insurance participation, measured in terms of both acreage and insurance liability, will probably maintain its current level or even grow.

As crop insurance subsidies and participation have increased, some observers have wondered if crop insurance may affect farmers' planting decisions by creating incentives to switch from one crop to another or to plant on land that might not otherwise be cropped (Knight and Coble, p. 150). Shifts in plantings could in turn affect total production, crop prices, regional patterns of production, and so on. This article describes the general features and performance of the Federal crop insurance program for wheat and examines the question of how crop insurance may affect cropping decisions.

How Crop Insurance Works

Producers of wheat and more than 100 other crops can purchase insurance at subsidized rates under Federal crop insurance programs. These insurance policies make indemnity payments to producers based on current losses related to either below-average yields (yield insurance) or below-average market revenue (revenue insurance). Policies are sold through private insurance companies, but the Federal Crop Insurance Corporation (FCIC)[3] pays a portion of the insurance premiums and pays an additional subsidy to insurance companies for administrative and operating expenses. The Government also shares underwriting gains and losses with the companies under the Standard Reinsurance Agreement. Under ARPA, farmers will pay around 40 to 50 percent of the total premiums for most levels of coverage. Farmers sign up for insurance prior to planting, but usually pay premiums after harvest.

[1] Agricultural economists, Field Crops Branch and Agriculture and Trade Outlook Branch, respectively, Market and Trade Economics Division, ERS.

[2] This understates the insurance participation rate for wheat that is intended for grain harvest, since some planted wheat acres are used for haying and grazing.

[3] The Federal Crop Insurance Corporation (FCIC) has no actual employees. It is managed by USDA's Risk Management Agency (RMA).

Several types of crop insurance are available (see box "Crop and Revenue Insurance Products"). Some plans protect against low yields, while others insure against low revenue. Some base premium and indemnity payments on farm yields or revenue, while others use county yields or revenues. Farmers have been required at various times to obtain crop insurance in order to be eligible for benefits from other farm programs, but insurance participation is generally voluntary.

Program History and Performance

Wheat was the original crop covered by Government-backed crop insurance when the Federal Crop Insurance Act of 1938 created the Federal crop insurance program (Gardner and Kramer, p. 196). The crop insurance program operated on a rather limited basis for over 30 years, until Congress passed major reforms in 1980. This legislation intended to make crop insurance the primary Government program dealing with uncertain crop production, replacing the standing disaster payment programs of the 1970s. This reform greatly expanded the availability of crop insurance and created premium subsidies in hopes of raising farmer participation.

In response to numerous, large, ad hoc disaster payments in the late 1980s and early 1990s, major insurance reform was passed in 1994. The goals of this reform were to reduce the likelihood of ad hoc disaster payments, increase crop insurance participation, and reduce the incidence of "double payments" from these programs. Specific provisions included:

- repeal of "emergency" designation in the Federal budget for disaster payments (that is, disaster payments had to "count" in the Federal budget totals, presumably reducing their attractiveness to Congress);
- creation of catastrophic (CAT) coverage offered at low cost to producers;
- higher premium subsidies for buy-up coverage (coverage above CAT);
- linkage between crop insurance and other farm program benefits;
- creation of the Non-insured Assistance Program (NAP) for crops not covered by crop insurance.

The linkage between crop insurance and other farm programs meant that farmers in 1995 were required to obtain at least CAT coverage for each insurable crop in order to be eligible for various other U.S. Department of Agriculture program benefits such as deficiency payments and FSA loans. This linkage, along with the fact that CAT was available for only a small processing fee, boosted insurance participation tremendously. Insured acres for all crops more than doubled, from 99.6 million for the 1994/95 crop year to 220.6 million in 1995/96. Insured acres for wheat jumped similarly, from 29.2 million in 1994/95 to 58.2 million in 1995/96. CAT accounted for practically all of this increase: the year-to-year increase of 121.0 million insured acres for all crops included 115.3 million CAT acres, and the 29.0 million added wheat acres included 27.3 million CAT acres.

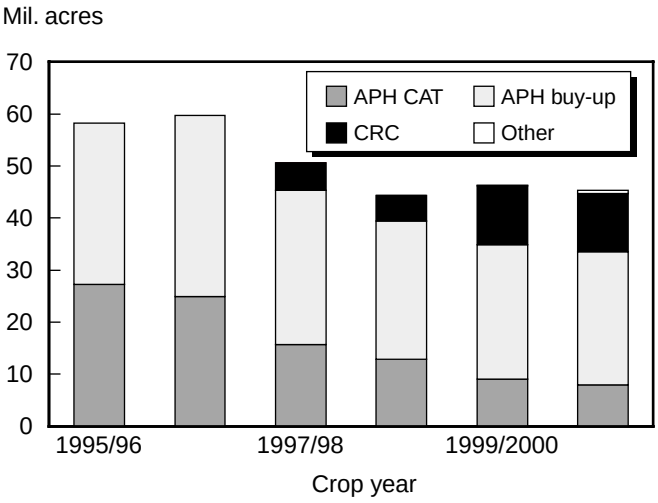
The 1996 Farm Act modified this linkage by dropping the requirement to purchase insurance for farmers who agreed to waive their rights to future disaster payments. Insured acreage declined somewhat, though not falling back to their previous levels. Since this dip in 1996/97, insured acres have risen again, totaling about 205 million acres for all crops in 2000/01. Insured wheat acreage actually increased from 1995/96 to 1996/97, corresponding to an increase in planted acreage, but since then both planted and insured acres have declined.

However, another measure of insurance participation has trended up for wheat since 1995. The ratio of insurance liability (the maximum possible indemnity) to total crop value for wheat was only about 29.5 percent in 1995/96 but rose to over 50 percent in 1999/2000 and 2000/01. Table A-1 shows both measures of insurance participation for wheat since 1990.

This relative growth in insurance liability is due to shifts among the various types of insurance coverage, mainly out of CAT and into APH buy-up (Actual Production History coverage, based only on yields) and the revenue insurance products. Figure A-1 shows these trends. After representing about 47 percent of insured wheat acres in 1995/96, CAT represented only about 17 percent in 2000/01. APH buy-up's share increased slightly over the same time, from 53 to 57 percent, and Crop Revenue Coverage's (CRC) share rose to about 25 percent. Other buy-up products accounted for just

Figure A-1

Wheat acres insured under various insurance plans



Source: Risk Management Agency, USDA.

Crop and Revenue Insurance Products[1]

Several insurance products are available for wheat, including:

- Actual Production History (APH) yield insurance at Catastrophic (CAT) and buy-up coverage levels
- Group Risk Plan (GRP) yield insurance
- Crop Revenue Coverage (CRC) revenue insurance
- Revenue Assurance (RA) revenue insurance
- Income Protection (IP) revenue insurance
- Group Risk Income Protection (GRIP) revenue insurance.

Actual Production History (APH). APH coverage is the oldest and most widely available crop insurance product. It protects farmers against yield losses due to natural causes such as drought, excessive moisture, hail, wind, frost, insects, and disease. Yield coverage levels are based on a producer's expected yield, which is calculated from the farm's actual production history (average yields over the last 4 to 10 years). The farmer selects a yield coverage level, ranging from 50 to 75 percent of average yield (up to 85 percent in some areas), and an indemnity price, ranging from 55 to 100 percent of the expected crop price, as estimated by the Risk Management Agency (RMA). If the harvested yield is less than the insured yield, the farmer receives an indemnity based on the difference between the actual yield and the insured yield. The total indemnity equals this yield shortfall times the indemnity price times acres insured.[2]

The CAT version of APH provides the lowest level of coverage on yield losses. CAT pays indemnities at a rate of 55 percent of RMA's established price when farm yield losses are more than 50 percent. CAT premiums are completely paid by the government through RMA, but producers must pay an administrative fee for each crop insured. ARPA raised this fee to $100 for the 2001/02 crop year. Currently CAT coverage is also offered on Income Protection policies, but participation in IP-CAT has been extremely low. Coverage above the CAT level is often referred to as "buy-up."

Group Risk Plan (GRP). GRP policies use county yields as the basis for determining insurance. When the county yield for the insured crop falls below the trigger level chosen by the farmer, an indemnity is paid. Yield coverage is available for up to 90 percent of the expected county yield. This type of insurance is best suited for farmers whose yields track closely with the county average, since an individual farmer's crop loss may not be completely covered if the county yield does not suffer a similar level of loss.

Crop Revenue Coverage (CRC). Among revenue insurance products, CRC has been the most popular. CRC provides protection against gross revenue (i.e., price times yield) falling below a guaranteed level. Guaranteed revenue is equal to the farmer's elected coverage level (50 to 75 or 85 percent), times the APH yield, times the higher of: (a) the "base market price," which is a month-long average of the harvest-time futures price prior to planting; or (b) the "harvest market price," defined as the average price for the same futures contract over a month's time near harvest. CRC thus provides higher coverage in years when harvest prices are higher than what was expected at planting. When a farmer's actual revenue (calculated as the actual yield times the harvest market price) is below the guaranteed revenue, CRC pays an indemnity equal to the difference between those two amounts.

Revenue Assurance (RA). RA coverage is similar to CRC, with two differences. First, farmers can choose between RA's "base price option," where the revenue guarantee is determined using only the pre-planting price; or the "harvest price option," where the revenue guarantee increases if harvest prices are higher, just like CRC. The harvest price option carries a higher premium. Second, RA also offers whole farm coverage whereby wheat can be combined with other crops also insurable under RA in that area.

Income Protection (IP). IP provides protection similar to RA with the base price option but requires producers to use "enterprise units." This means that the policyholder must insure all acreage for one crop in a county under a single unit (rather than having separate coverage for different landlords, land sections, etc.). Premiums are lower, but IP requires that losses occur across a wider area before an indemnity is paid.

Group Risk Income Protection (GRIP). GRIP is a revenue insurance plan that uses county yields instead of farm yields when calculating revenue coverage levels and actual revenue. Farmers may select revenue coverage levels from 70 to 90 percent of expected county revenue, where county revenue is equal to the historic county yield times the relevant futures price averaged across 5 days prior to planting. Actual county revenue is calculated as the actual county yield times a month-long average of the new-crop futures price at harvest time. GRIP pays indemnities only when the actual county revenue for the insured crop falls below the revenue guarantee chosen by the farmer.

[1] Visit the Risk Management Agency's web site for more details on different types of crop insurance coverage. The page describing the various policies is located at *http//www.rma.usda.gov/policies.*

[2] This example assumes the producer has a 100% interest in the crop. Farmers who have a smaller share in the crop due to a share rental arrangement may insure only their share of the crop.

Table A-1--Crop insurance participation for wheat, 1990/91-2000/01

Crop year	Insured acres	Planted acres	Insured/ planted acres 1/	Value of production 2/	Insurance liability	Insurance liability/value of production
	Million		Percent	Million dollars		Percent
1990/91	36.3	77.0	47.1	7,125	2,432	34.1
1991/92	26.4	69.9	37.8	5,940	1,590	26.8
1992/93	28.7	72.2	39.8	7,993	1,741	21.8
1993/94	29.6	72.2	41.0	7,811	1,779	22.8
1994/95	29.2	70.3	41.5	8,007	1,860	23.2
1995/96	58.2	69.0	84.3	9,933	2,930	29.5
1996/97	59.7	75.1	79.5	9,791	3,338	34.1
1997/98	50.6	70.4	71.9	8,386	3,221	38.4
1998/99	44.3	65.8	67.3	6,750	2,897	42.9
1999/00	46.3	62.7	73.8	5,702	3,177	55.7
2000/01	45.4	62.5	72.6	5,891*	3,100	52.6

*Forecast.

1/ Understates the participation rate for wheat acres intended for grain harvest, since some planted acres are intended for haying and grazing.

2/ Calculated using USDA data for total wheat production and season-average farm price.

Sources: Risk Management Agency, National Agricultural Statistics Service, Economic Research Service, USDA.

over 1 percent of wheat insured acreage in 2000/01. Preliminary sign-up results for the 2001/02 wheat crop indicate a large increase in CRC and Revenue Assurance (RA) acreage, with these two revenue products representing about 58 percent of insured acres, and APH buy-up and CAT coverage representing about 42 percent (Risk Management Agency).

The rapid growth of revenue insurance is not limited to wheat, as revenue products accounted for about 51 percent of the corn acres insured and 40 percent of the soybean acres insured in 2000/01. This growth reflects several factors. The most obvious one is farmers' interest in insuring revenue rather than just yields. Some have also suggested that as the 1996 Farm Act shifted farm program payments away from deficiency payments, farmers have become more concerned with adverse price movements. However, it must be noted that all the revenue insurance products protect only against revenue declines for a crop year, not against multi-year declines that reflect longer term changes in market conditions.

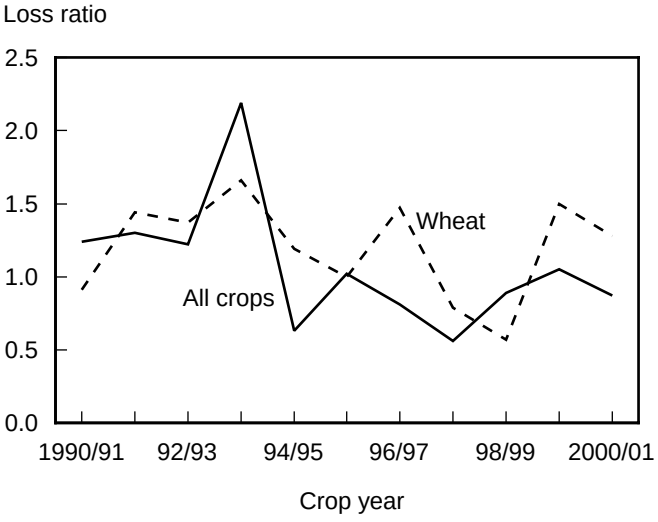
While one goal of the crop insurance program has been to increase farmer participation, another goal has been to attain sound actuarial performance. Actuarial performance is usually measured with the "loss ratio," defined as indemnities divided by premiums. If the loss ratio exceeds 1.0, then indemnities exceed premiums. Unlike some other forms of insurance, the loss ratio for crop insurance can vary widely from year to year due to widespread weather events like drought or flood, which have a large impact on indemnities. Thus, actuarial performance must be judged over a longer period of time. In 1993 Congress established a target of 1.075 for the long-term, overall program loss ratio (that is, measured across all crops in the program over an extended period of time).

Figure A-2 shows the annual loss ratios from 1990/91 to 2000/01 for both wheat and all crops. More often than not, the loss ratio for wheat was higher than that for the overall program. Annual loss ratios for wheat ranged from 1.66 in 1993/94 to 0.57 in 1998/99, reflecting annual conditions. Examining the entire 1990/91-2000/01 period for wheat, total indemnities were $3.044 billion and premiums were $2.591 billion, resulting in a loss ratio of 1.17.

Rising premium subsidies were also a distinguishing feature of the crop insurance program over the 1990s. Figure A-3 shows annual amounts for both total premium subsidies and the average premium subsidy rate for wheat over that decade. The significant jump in 1995/96 resulted from both the introduction of CAT (where the government pays the entire premium) and higher subsidy rates on buy-up. CAT became less important in subsequent years, but the additional premium discounts provided by Congress in 1999 and

Figure A-2

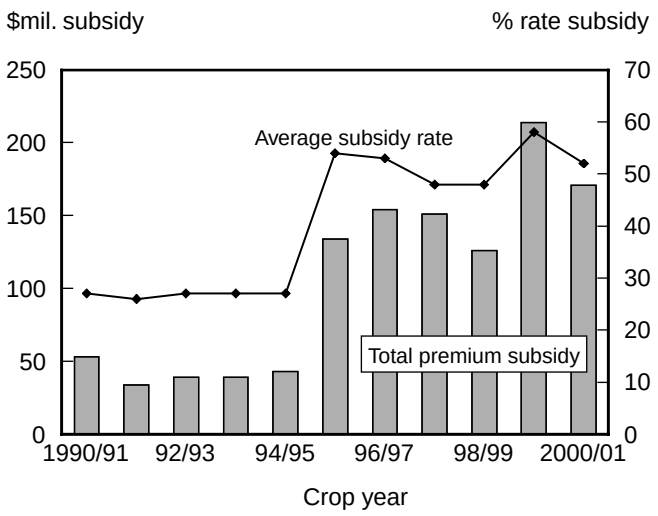
Crop insurance loss ratios



Source: Risk Management Agency, USDA.

Figure A-3

Crop insurance premium subsidies for wheat



Source: Risk Management Agency, USDA.

2000 resulted in average premium subsidy rates over 50 percent in those years. In absolute dollar terms, premium subsidies for wheat topped $150 million in 4 of the last 5 years. Total premium subsidies for wheat over the 1990/91-2000/01 period totaled $1.158 billion. Farmers paid $1.433 billion in premiums over this time.

One of the major components of the Agricultural Risk Protection Act of 2000 (ARPA) was a revision of the premium subsidy structure. Table A-2 provides a comparison of subsidy rates for the previous regime and for the new ARPA regime.[4] Notice first that subsidy rates are raised for all coverage levels, resulting in subsidies above 50 percent for most levels of coverage. However, now the difference in subsidies across coverage levels is much narrower. For many years, 65/100 coverage (65 percent of expected yield, 100 percent of expected price) has been the clear favorite for participants, but the narrower differential in premium subsidies will probably change this. Preliminary insurance sign-up results for the 2001/02 wheat crop indicate that about 31 percent of acres are insured at the 65 percent level, while about 49 percent are insured at the 70 percent coverage level or higher.

In addition, the subsidies for revenue coverage have increased significantly relative to APH coverage. This already appears to provide further impetus in the move towards revenue coverage, as described earlier.

[4] The subsidy rates listed in table 2 do not reflect the additional premium discounts provided in 1999 and 2000, which amounted to approximately an additional 30 percent producer premium reduction across all coverage levels in 1999 and an additional 25 percent reduction in 2000.

Can Crop Insurance Affect Plantings and Prices?

As premium subsidies have risen, some observers have questioned whether crop insurance subsidies might have unintended effects on farmer behavior (Gardner, and Knight and Coble). Could subsidized crop insurance encourage farmers to assume additional risk? Are subsidies large enough to encourage shifts in plantings from less risky crops to more risky crops or from less risky regions to more risky ones? Do they encourage plantings on marginal lands that otherwise might not be cropped?

Some negative consequences could result from these types of planting shifts. Additional plantings increase total production and reduce crop prices. Demand for inputs and land prices would likely be affected. Regional shifts in production could favor some areas while hurting others. Farming on more marginal land—for example, shifting land from pasture to crop production—could add to soil erosion, chemical use, and water quality problems.[5] Distortions in production and prices could even have implications for trade negotiations, as the United States is committed under major trade agreements to limit its spending on agricultural programs (including crop insurance) which may directly affect crop plantings and prices.

How could crop insurance affect planting decisions? A farmer's choice for selecting which crops to plant reflects the expected returns and risks of the crops, just as an investor's choice of stocks and bonds reflects the returns and risks of different securities. By changing the net expected returns to a crop and by reducing the risk of producing the crop, crop insurance affects farmers' crop production decisions.

The most obvious way that crop insurance can affect net expected returns of a crop is through premium subsidies. (See box: "CRC Coverage for Durum Wheat—A Special Case", for an illustration of the potential for crop insurance to distort production decisions.) Assuming that insurance premiums accurately reflect expected losses over time, lowering the premium through government subsidy means that farmers could expect higher incomes over time—not in any particular year, but on average over several years—by purchasing crop insurance. Farmers who already intend to purchase crop insurance realize an immediate input cost savings. Over the 1990/91-2000/01 period, wheat farmers benefited from $1.158 billion in premium subsidies.

Farmers also benefit from insurance to the extent that total premiums under-estimate total indemnities. As mentioned

[5] The Farm Service Agency's conservation compliance rules do not prohibit "sod-busting," though they do require approval of a new farm conservation plan that usually requires stricter conservation practices on land brought into crop production.

Table A-2--Crop insurance premium subsidy rates under the Agricultural Risk Protection Act of 2000 and previous laws

	Percent of total premiums paid by Federal Crop Insurance Corporation 1/		
Coverage level 2/	ARPA: All policies	Previous law: APH	Previous law: CRC
50/100	67	55	42
55/100	64	46	35
65/100	59	42	32
70/100	59	32	25
75/100	55	24	18
85/100	38	13	10

1/ The subsidy rates listed do not reflect the additional premium discounts provided in 1999 and 2000, which amounted to approximately an additional 30 percent producer premium reduction across all coverage levels in 1999 and an additional 25 percent reduction in 2000.

2/ The first number represents the yield guarantee level, or percentage of average yield covered by insurance, and the second number represents the percentage of the expected price used to calculate coverage and indemnities.

Source: Risk Management Agency.

earlier in the discussion of actuarial performance, this potential benefit needs to be considered over an extended period of time, as indemnities in any particular year reflect conditions for only that year. Over the 1990/91-2000/01 period, total crop insurance premiums on wheat were $2.591 billion, while total indemnities were $3.044 billion.

From a farmer's viewpoint, net expected returns from insurance reflect the difference between premiums paid and indemnities received. This "net indemnity" reflects both premium subsidies and actuarial performance as just described. This effect on expected net returns may be referred to as the subsidy effect of insurance. Over the 1990/91-2000/01 period, wheat farmers paid $1.433 billion in premiums, while receiving $3.044 billion in indemnities.

This subsidy effect enhances the expected net returns for a crop, giving it a potential advantage over other crops in the planting decision. Since most crops can now be insured in most areas, expected net returns from insurance affect expected net returns for each crop considered by the farmer. Because subsidies are calculated as a percentage of the premium, crops with higher premiums receive a higher subsidy, calculated on a dollar-per-acre basis. The amount of the premium reflects the expected value of the crop, its yield uncertainty as represented by the premium rate, and the coverage level chosen. Thus, the amount of expected subsidy depends on whether a crop is "high risk" or "low risk", and "high value" or "low value."

Crop insurance also has a risk reduction effect in addition to any subsidy effect. That is, insurance eliminates the worst outcomes in exchange for the premium payment, making a crop less risky and potentially more desirable in the crop mix. Even in the case of unsubsidized "fair" insurance—where premiums are equal to indemnities over time—crop insurance would offer this additional benefit. However, while the risk reduction effect is quite real, it is more difficult to measure, in terms of dollars per acre, than the subsidy effect. Each individual has unique attitudes toward risk, and yield variability differs from farm to farm, so the amount of money each person might be willing to pay simply to avoid risk is not directly observed.

Measuring the Effects of Crop Insurance On Plantings and Prices

The extent to which crop insurance affects farmers' planting decisions may have important aggregate effects. More planted acres lead to higher production and lower crop prices. Lower expected market prices could cause farmers in other regions to change their plantings. A subsidy to wheat producers in one region may have negative effects on producers in other regions. Acreage in subsequent periods may also decline in response to lower prices. It is important to note that this price-reducing feedback effect could mitigate to some extent the acreage-increasing effects of crop insurance subsidies.

Competing crops also receive crop insurance subsidies, with accompanying acreage response and price effects. Wheat traditionally competes with grain sorghum and cotton in the Southern Plains, and with barley in the Northern Plains. In recent years corn and soybean production have expanded into traditional wheat producing areas and must also be considered.

Market impacts were analyzed using the POLYSYS-ERS simulation model (Ray, *et al.*) for an average or representative year.[6] The model simulates aggregate market behavior for eight crops (corn, grain sorghum, barley, oats, wheat, soybeans, rice, and cotton) over seven regions (see fig. A-4 for the demarcation of these areas). Crop insurance subsidies were modeled by converting them to a per-bushel equivalent and adding them to the crop price in a net returns framework.

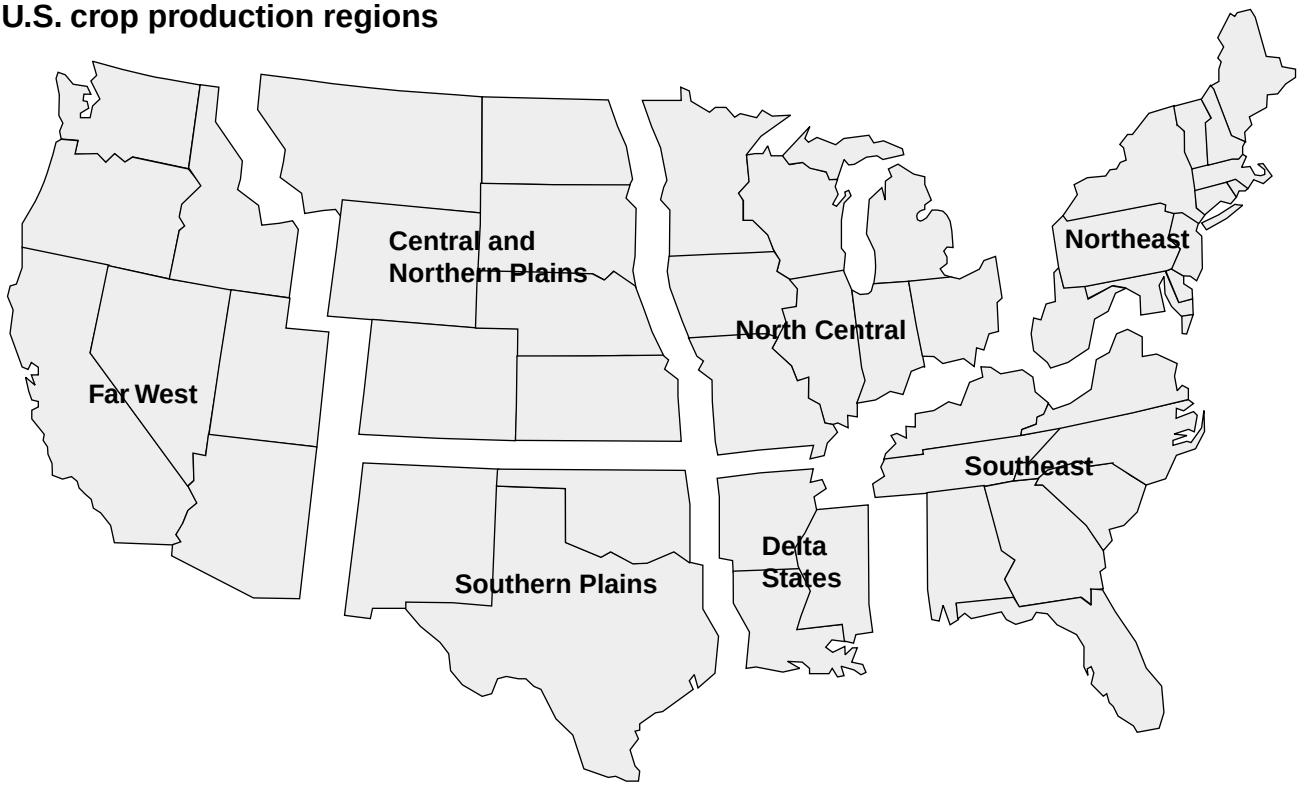
Crop insurance subsidies were calculated as the expected net indemnity (total indemnity minus farmer premium).[7] Total net indemnities reflect the new ARPA premium

[6] The results are not year specific.

[7] Administrative and operating subsidies paid by RMA to insurance companies are not included in the estimated premium subsidies.

Figure A-4

U.S. crop production regions



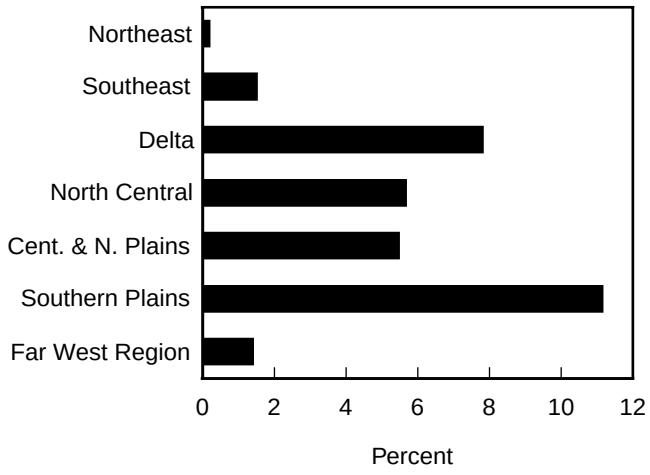
subsidy rates. Net indemnities also include the expected value of the excess of indemnities over total premiums, estimated using the insurance loss experience over 1990-1998. Projected insured acreage was used to determine the net indemnity per acre, and expected yields were used to convert the subsidies to a per-bushel (pound/cwt.) basis. Expected indemnities were calculated for each of the eight crops by region. Figure A-5 shows the expected net indemnities for wheat as a percent of price for the seven regions.

We do not account for the risk reduction effects of insurance in the model. Unpublished research by Heifner and Coble indicates that the risk reduction effects, when converted to a dollar-per-acre basis for a typical farmer, are relatively smaller than the subsidy effects. However, to the extent that insurance premiums reflect the relative risk of producing alternative crops in different regions, the premium subsidies partially capture incentives to switch to riskier enterprises due to the availability of subsidized insurance.

The simulation results are indicative of the average or representative effects of crop insurance subsidies on the wheat market. Changes in aggregate market impacts reflect the relative changes in net returns among alternative crops after insurance is added and market prices equilibrate. Total wheat acreage expands about 300,000 to 350,000 acres on average, roughly a 0.5-percent increase in acreage compared with a scenario of no crop insurance subsidies. Total acreage for all eight field crops expands about 900,000 acres, so that wheat accounts for about one-third of the total increase. Total wheat production increases by 0.7 percent and wheat market prices fall about 2 to 2.5 percent as a result of the additional acres in production. Wheat's inelastic demand creates a situation where price falls by a larger percentage than production rises, resulting in lower overall annual market returns. The simulation indicates market returns for wheat in this scenario

Figure A-5

Premium subsidies per bushel as a percent of wheat prices



Sources: Risk Management Agency and Economic Research Service, USDA.

CRC Coverage for Durum Wheat—A Special Case

While the analysis presented in this article concludes that crop insurance subsidies have a relatively small effect on planting decisions, the case of CRC coverage for durum wheat in 1999 illustrates a greater potential for insurance programs to distort market signals.

CRC pays an indemnity when actual revenue falls below a revenue guarantee. This revenue guarantee is calculated as:

- the producer's APH yield, times
- some measure of expected price prior to planting, (the "base market price" in CRC terminology), usually based on a futures contract price, times
- the insurance coverage level selected by the farmer, as high as 85 percent of expected revenue (that is, a 15-percent deductible).

Actual revenue is calculated as the farmer's actual yield times the "harvest market price," usually the average price over a month's time at harvest on the same futures contract.

Determining an appropriate "base market price" has been more difficult for durum than for most other field crops. CRC typically uses widely traded futures contracts for major crops to establish both its base market price and harvest market price.[1] For the major classes of wheat, hard red winter uses the Kansas City Board of Trade July contract, hard red spring uses the Minneapolis Grain Exchange (MGE) September contract, and soft red winter uses the Chicago Board of Trade July contract. Coverage for wheat grown in Western States, mainly white wheat, uses prices from the Portland Grain Exchange for setting coverage. However, the MGE durum futures contract, which was only established in 1998, is very thinly traded, and there was some concern in 1999 that its trading might be too thin to provide an appropriate expected price. As a result, another method was used to establish the base market price.

HRS futures price + spread used in 1999. Because of the concern over the durum futures contract, the CRC base market price was defined as the average during February of the September MGE HRS futures price plus the 5-year average Minneapolis milling price premium for durum over Minneapolis futures. This premium was $1.92/bushel, resulting in a base market price for insurance coverage of $5.45/bushel.[2] Thus, a farmer with an APH yield of 30 bushels per acre could get a revenue guarantee of $138.97 per acre by using the 85-percent coverage level (= $5.45/bu x 30 bu/a x 85 percent). To put this level of coverage in perspective, this farmer could have realized a normal yield of 30 bushels per acre and still received an indemnity if the CRC harvest market price fell below about $4.63. With a yield of 20 bushels per acre, an indemnity would have been paid if the harvest market price was less than $6.95.

Confounding the problem was that in February 1999, no significant price premium existed for durum over HRS. So at first glance, the coverage appeared to offer a potential windfall and received considerable attention in the farm media.

What was the acreage response? According to the National Agricultural Statistics Service, 1999 planted durum acreage in North Dakota (which usually accounts for over 75 percent of U.S. durum production) increased 450,000 acres over the 1998 total of 3.0 million acres, in spite of the fact that durum prices were at 5-year lows. Unpublished data from RMA indicate about 4.2 million acres of durum were insured in North Dakota in 1999 across all insurance plans, with about 3.3 million acres insured under CRC.[3] Just over 900,000 acres were indemnified in North Dakota because adverse conditions prevented planting.

Program rules also permitted producers with no durum yield history to use their HRS yield history to establish their durum APH yield. Over the last 20 years, HRS yields have averaged about 5 percent higher than durum yields. While this difference is relatively small, requiring these producers to instead use "T-yields" for their durum APH yield would have significantly reduced the expected benefits of the coverage.[4] Using HRS yields did not create the expected windfall, but it gave more producers access to it.

The situation in 2001. On March 5, 2001, RMA announced CRC would not be available for durum wheat planted in 2001. After 1999, the CRC base market price for durum coverage was to be determined using the average price of the MGE September durum futures contract during the month of February. Rules also required a minimum of 15 daily prices be included in the average,

[1] The wheat futures contract used varies according to State and planting date.

[2] Some producers erroneously thought that this was the price guarantee. If number 1 durum wheat was not produced, the CRC contracts imposed a negative basis of up to $0.70.

[3] The RMA acreage total exceeds the USDA March 1999 planting intentions report, but this difference is explained by the prevented plantings area and the fact that planting intentions may well have changed between the March 1 survey date and the March 15 insurance sales closing date due to the attention received by the CRC coverage.

[4] Producers are typically assigned "transitional yields," or "T-yields," for the missing years in their APH yield history. T-yields are usually calculated as 60% of the county average yield.

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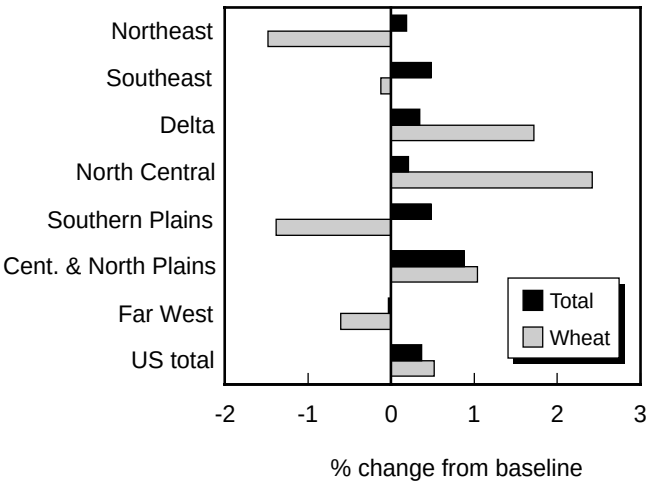
with each daily price having a minimum of 25 open interest contracts. If the minimum number of daily prices with the minimum level of open interest was not found for the September contract during the month of February, prices could be taken from the July contract. The MGE September and July durum wheat futures contracts failed to fulfill these minimum requirements, so the CRC base market price could not be established. Though CRC is not available this year, durum producers may still insure their 2001 crops under APH coverage (yield insurance). The maximum price election on this coverage was announced as $3.40. However, higher revenue protection is available for durum producers under another revenue product, Income Protection (IP). IP's "projected price" was calculated using slightly different rules than CRC, resulting in a price of $4.38 for durum wheat in 2001. However, unlike CRC, IP coverage does not increase if harvest prices are higher than what was expected at planting. IP also requires that farmers insure all durum acreage in the county as one unit. Durum producers may also insure their durum wheat under a CRC policy as HRS wheat.

are about $150-$200 million lower than in the scenario with no insurance, offsetting about two-thirds of the aggregate monetary benefits of insurance subsidies.

Wheat acreage does not increase in all regions in response to the premium subsidies (fig. A-6). While premium subsidies have the direct effect of increasing net returns from wheat production, the resulting higher production reduces market prices, partially offsetting the incentive to expand production in subsequent years. In addition, subsidized insurance products are also available for competing crops, creating incentives to increase their production, with subsequent reductions in prices. Thus, the net incentives created by insurance subsidies for a particular farmer depend on premium subsidies for wheat as well as for competing crops and on market price adjustments. Acreage increases in three of the seven regions, with the largest increase coming in the Central and Northern Plains region. Wheat acreage decreases in the Southern Plains by almost 170,000 acres, a 1.4-percent decline for that region. This is mainly due to an increase in cotton acreage, which results from a $26.51/acre expected net indemnity for cotton.

Figure A-6

Percentage shifts in wheat acreage resulting from crop insurance subsidies



Northeast and Southeast represent less than 10,000 acres of wheat.

Source: Economic Research Service, USDA.

Some limitations to this approach should be mentioned. First, the expected net indemnities were calculated as averages across all insurance coverage levels. Higher coverage levels receive larger subsidies, measured in absolute dollar amounts, which could then affect the expected net indemnity. If farmers continue to switch toward higher coverage levels, then the subsidy levels used here may under-estimate the actual subsidies received by farmers. Second, the assumption that crop insurance subsidies affect returns to the same extent as crop prices overstates the case for producers who view insurance as an optional expense. Also, indemnities received on an irregular basis may count for less in a producer's calculation of expected returns than an outright price change. Third, the simulation does not capture the risk reduction effect of insurance. However, some evidence exists that it is less important than the subsidy effect in explaining crop insurance participation. In spite of these limitations, the net benefits of insurance are still probably small enough to preserve the qualitative result that crop insurance tends to have a relatively small effect on wheat acreage and all field crop acreage in general.

Another important observation from the simulation is that price feedback and cross-price effects tend to dampen the own-price effect of insurance subsidies on crop acreage.[8] Higher plantings lead to higher production, which in turn results in lower prices (absent any changes in demand). Some of the acreage may then shift back out of production in subsequent periods. Cross-commodity price effects appear important too, as the net benefits of crop insurance appear to be much higher for some crops than others, causing an acreage shift from one crop to another. Ignoring these feedback and cross-commodity price effects leads to an over-estimate of the acreage increases due to insurance.

[8] The scenarios did not incorporate the effects of loan rates on acreage in order to isolate the effects of insurance. If the market is in a low-price regime, the loan rate supports expected returns even when prices are low, and high plantings may persist. In this case, the price-dampening feedback effect on acreage could be quite limited.

Summary

The federal crop insurance program for wheat has grown into a significant government program for wheat production in recent years. More than 45 million wheat acres were insured in 2000/01, roughly 73 percent of planted acres. CAT coverage, introduced by the 1994 crop insurance reforms, is declining in importance, while revenue insurance has become prominent in just a few years. The changes in premium subsidy rates established by ARPA are likely to reinforce the trend toward using higher insurance coverage levels and revenue insurance.

Crop insurance subsidies do appear to effect planting decisions, which in turn affect production and prices. However, these effects appear small: simulation results suggest that wheat acreage under the ARPA premium subsidy structure would be about 0.5 percent higher than total acreage in the absence of any insurance program. The own-price feedback effect suggests that while some new acreage may be brought into production because of insurance subsidies, this acreage shift is limited by the price-dampening effect of additional production. Cross-commodity effects were important, too, as crops receiving larger insurance subsidies could crowd out those receiving less.

An important exception to this conclusion for wheat growers is the case of revenue insurance for durum in 1999. There, the expected crop price used in setting revenue coverage exceeded producers' expectations. Farmers' response to what seemed a "sure thing" under artificially high coverage levels was clearly greater than in the standard insurance case with more accurate coverage levels and meaningful deductibles.

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